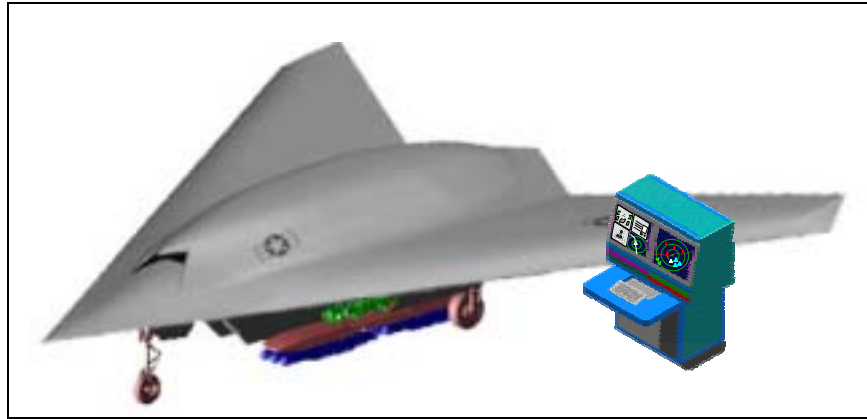




Unmanned Combat Air Vehicle (UCAV) X-45C Demonstrator System



Overview

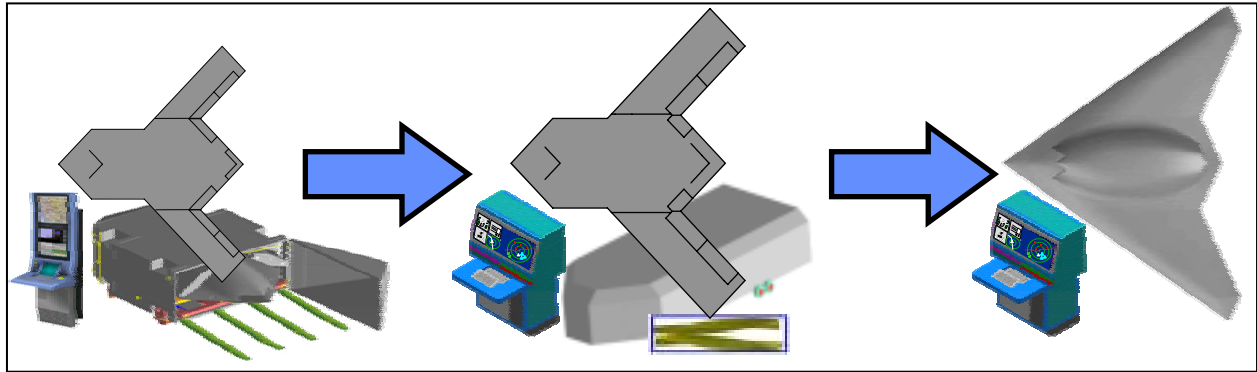
The Unmanned Combat Air Vehicle (UCAV) System Demonstration Program is a joint DARPA/Air Force/Boeing effort to demonstrate the technical feasibility, military utility and operational value for a UCAV system to effectively and affordably prosecute 21st century Suppression of Enemy Air Defenses (SEAD) and strike missions within the emerging global command and control architecture. The mission of the UCAV program is to field a weapon system that integrates distributed adaptive control technology and robust communications with a next generation unmanned stealth platform. UCAV will be a revolutionary force enabler for the 21st century.

X-45C Demonstrator System

The UCAV System Demonstration Program has at its core the successful completion of over 150 demonstration events. These events include analysis, component developments, simulations, ground tests and flight tests. The demonstrator tool set that is being developed to support these demonstrations consists of four principle elements: a sophisticated system simulation; a set of representative air vehicles; a suite of mission control items, and key supportability related components.

The UCAV System Development Program is using spiral development – an iterative process for developing defined sets of incrementally increasing capabilities. Although two Spiral 0 (X-45A) demonstrators are currently verifying the core functionality of the UCAV software, it was understood from the start of the program that a second iteration of UCAV air vehicle design and development would be necessary to complete the system demonstration plan and mature the critical technologies, processes and system attributes to a level sufficient to enter into an acquisition program. This Spiral 1 demonstrator system was originally envisioned with an X-45B demonstrator, but – recognizing the problems of access to distant landlocked theaters – DARPA and the Air Force modified the operational objectives for greater payload, range, and persistence,

with a resulting change to the demonstrator design. The move to meet these operational objectives enables the Air Force and the Navy to pursue a common demonstrator platform. (A comparison of each of these UOS visions is given in the figure below.) The demonstrators based on this more capable UCAV Objective System (UOS) design are designated as the X-45C. The X-45C demonstrator system will complete nearly one third of the more than 150 discrete demonstrations.



Summary of UCAV UOS evolution upon which the X-45A, X-45B and X-45C were based

Using an innovative collaborative requirements development process, the UCAV team of warfighters, technologists, and developers have been re-examining major aspects of the operational vision and are incorporating modifications as appropriate. The UCAV team has been defining requirements for the X-45C air vehicle, mission control system and support segment and conducting design trades. While the design is not complete, some key top-level features have been decided. A short review of each segment follows.

Air Vehicle: The key challenge in the air vehicle segment remains affordable integration. The design and development of the Spiral 1 air vehicle is the next step in the evolution of an affordable operational UCAV. The larger X-45C air vehicle will more closely represent the envisioned operational system, to include two full weapons bays, a stores management system, incorporation of low observable (LO) technologies, and provisions for a spot Synthetic Aperture Radar (SAR), Electronic Support Measures (ESM), MILSTAR, and aerial refueling. The X-45C will replace the A-model avionics pallet with a fully integrated avionics suite. Continued upfront emphasis on supportability will enable this robust prototype to provide a residual operational capability, if necessary.

Mission Control System: The main physical refinement to the Mission Control System (MCS) is in the shelter and operator interface. The C-model will incorporate four updated mission control consoles in an existing air-transportable shelter. The consoles incorporate high definition television (HDTV) displays and lessons learned from the current demonstration program to enhance battle manager situational awareness and proficiency. Along with enhancements to the mission control architecture and software, these new physical assets provide the ability to realistically demonstrate the core functionality of the basic preemptive and reactive SEAD concept of operations, thereby proving the potential of the UCAV system.

Supportability: In contrast to the X-45A technology demonstrators, the X-45C aircraft will be robust prototypes and used in operational and user assessments. An initial Integrated Vehicle Health Management (IVHM) capability will predict component failures and allow maintenance personnel to perform corrective actions before suffering a failure. As with the objective system, the X-45Cs will be capable of deployment with rapid weapon loading/turn time, as well as maintainable low observable technologies. These supportability capabilities, like the air vehicle and MCS attributes, will be demonstrated as part of the System Demonstration Program.

Point of Contact

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